AAR-100

Human Factors Newsletter # 04-06

March 6, 2004 – March 26, 2004

Technical Information: AFS-410 is sponsoring a vertical flight human factors research project entitled "Precision Visual Flight Rules Simultaneous Non-Interfering project". The investigators are Dr. Rudy Darken and CDR Joe Sullivan (Naval Postgraduate School), Dr. Jeff Mulligan (NASA-Ames), and Steve Hickok (formerly of STI Corp, however STI Corp is no longer associated with the project). The objective is to collect test data that will allow the FAA to establish Precision Visual Flight Rules (PVFR) route widths and address human factors issues associated with the operation of Global Positioning System (GPS) equipment while operating an aircraft under Visual Flight Rules (VFR). AFS-410's hypothesis states that rotorcraft with GPS navigation capabilities can stay within narrow, defined horizontal airspace limits while operating under VFR. If the pilot maintains the aircraft within the confines of a PVFR route and if these routes can be designed to keep rotorcraft separated from fixed-wing traffic, then PVFR routes offer rotorcraft the possibility of operating in congested airspace simultaneously with fixed-wing aircraft on a non-interfering basis, hence the term Simultaneous Non-Interfering (SNI) route.

Last October, Steve Hickok measured the ability of ten helicopter pilots to fly PVFR and SNI routes in Tullahoma, TN (in cooperation with the University of Tennessee Space Institute). The day and night flight test assessed human factors, flight technical error, navigation system error, and total system error associated with operating GPS-equipped helicopters during PVFR/SNI operations. In parallel, the Naval Postgraduate School replicated the same task and terrain environment used in the in-flight study using a virtual simulation. They will then compare human factors data (visual scan patterns, performance, etc.) to determine if the simulation approximates actual flight and is therefore suitable for further investigation, e.g., what are the effects of increased traffic density? NASA-Ames has primarily focused on the development of a lightweight, comfortable head-mounted eye tracking device (to view device point to http://www.hf.faa.gov/docs/508/docs/VF-eyetracker.jpg) suitable for extended use in the helicopter and simulation. The objective of the eye-tracking task is to capture head pose and eye gaze position during flight to determine how much time the pilot monitors the GPS versus outside landmarks. From these three efforts, the results should lead to a report that recommends the minimum Required Navigation Performance (RNP) value for a VFR helicopter equipped with an IFR GPS. The minimum RNP value will help ATC develop procedures for VFR SNI routes.

The video clip is a brief 17-second illustration of one of subject pilot's night flight eye scans. In order to demonstrate all three efforts, the background scene shows the Naval Postgraduate School's virtual simulation (note, the illustration shows a daytime scene even though this flight was flown at night), the upper left picture is an enlargement of the pilot's eye, the upper right scene is the pilot's head with the eye tracker, and the center scene is a mosaic of the instrument panel (created from 3 frames from the camcorder), superimposed over the Naval Postgraduate School's fly-through terrain. A circular disk of enhanced contrast and brightness illustrated the scan path data. In this brief data segment, the pilot spends most of the time fixating on the GPS instrument.

To view the video clip, point to http://www.hf.faa.gov/docs/508/docs/VF-PVFRflight.mpg

Point of Contact: W. Krebs, AAR-100

Human Fatigue: Dr. Thomas E. Nesthus attended the National Transportation Safety Board (NTSB) Academy course titled "Investigating Human Fatigue Factors in Transportation Accidents" March 10-11, 2004. The 24/7 requirements of the transportation community pose significant physiological challenges for human operators. The human's need for sleep and a stable circadian clock can be disrupted by round-the clock operational requirements. These sleep and circadian disruptions can lead to fatigue, decreased performance and alertness, and the risk of errors, incidents, and accidents. The NTSB has identified fatigue as a contributory or causal factor in accidents in every mode of transportation.

This course was designed to provide participants with a working knowledge of fatigue and the skills required to examine the role of fatigue in an accident and determine whether this factor was contributory or causal. Participants learned about the physiological basis of human fatigue and what operationally relevant questions should be pursued to determine the role of fatigue in an accident. Proper analysis and interpretation of the information obtained can lead to a foundation for including or excluding fatigue as a factor. The course included eight examples of NTSB investigations involving fatigue and the results of NTSB examinations across all modes of transportation.

The NASA/NTSB crew fatigue analysis of the 1993 DC-8 crash at Guantanamo Bay, Cuba was used as a model for examining fatigue in an accident investigation. Additionally, the class was fortunate to actually interview one of the surviving crewmembers.

Participants also gained valuable experience by applying critical principles presented in the course during two interactive interview exercises with classroom participants. The exercises found few attendees without sleep and fatigue-related work/travel/personal schedule issues. (T.E. Nesthus, CAMI)

JANUS: Dr. Julia Pounds presented a paper titled *JANUS: A Technique for Identifying Operational Error Causal Factors* at the Safety Across High-Consequence Industries Conference held March 9 & 10, 2004 in St. Louis, Missouri. Abstract: Although human error has been repeatedly identified as a dominant risk factor in safety-oriented industries such as air traffic control (ATC), little is known about the causal factors leading to human and ATC operational errors. The Federal Aviation Administration developed and tested the JANUS

technique to better understand the role of human performance in operational errors. The results yield converging evidence that the JANUS technique appears to be more sensitive, useful, comprehensive, and practical than the current processes to identify causal factors. The results also suggest that the technique has great potential for application, although some work still needs to be done to support operational implementation. (J. Pounds, CAMI)

REDAC: Dr. Julia Pounds presented a briefing titled "Optimizing Human Performance" to the Research, Engineering and Development Advisory Committee (REDAC) Human Factors Subcommittee meeting in Atlantic City, March 3, 2004, The presentation gave an overview of the JANUS and National Air Traffic Professionalism (NATPRO) projects, both coordinated through the FAA Air Traffic Evaluations and Investigations Division. JANUS is a technique developed to elicit causal factors after operational errors, and is currently being developed for pilot deviations and ground operations. The technique for operational errors has undergone beta testing with scientific validation and is currently completing its operational assessment by participating air traffic facilities. The NATPRO project is an example of how information identified by operational error analysis can be turned into strategy and skill enhancement. NATPRO is a new training approach developed in concert with the Air Traffic Southern Region Learning Council and underwent its initial test at an air traffic facility at Miami's Air Route Traffic Control Center. Rather than relying solely on knowledge-based training, this approach integrates the concept of "performance coaching," and uses an awareness seminar coupled with a practicum. Mr. Randall Breedlove is the NATPRO Program Manager. (J. Pounds, CAMI)

ETMS: During March 22-23, human factors researchers from the National Airspace System NAS Human Factors Group at the William J. Hughes Technical Center supported Operational Testing of the Enhanced Traffic Management System (ETMS) Version 7.8. The Traffic Flow Management User Team will exercise the system by completing procedures that represent commonly performed functions on ETMS. They will also evaluate functions that are new in the system. The researchers will develop test and evaluation procedures with input from field representatives to ensure that the procedures are operationally relevant and appropriate. (E. Stein, WJHTC)

Institutional Review Board: Human factors representatives at the William J. Hughes Technical Center (WJHTC) received a request from the Transportation Security Laboratory for assistance in either establishing an institutional review board for the protection of human participants in research or in using the WJHTC local board. A copy of local board guidelines was provided. (E. Stein, WJHTC)

RNAV: The Required Navigation (RNAV) Performance (RNP) Division (ATP-500) and the Flight Operations Branch (AFS-410) met at the Research and Development Human Factors Laboratory to address human factors issues associated with RNAV procedures. Discussion topics included the Alaska Airlines approach to San Francisco International Airport and RNP approaches to other airports. (E. Stein, WJHTC)

Weather Data: Dr. Vicki Ahlstrom from the NAS Human Factors Group met with representatives from the Weather Processors & Sensors Group (ACB-630) to explore possible ways to acquire Integrated Terminal Weather System (ITWS) weather data. During the meeting, Dr. Ahlstrom demonstrated the current weather simulation capabilities at the William J. Hughes

Technical Center's Research, Development and Human Factors Laboratory. Members from the Weather Processors & Sensors Group provided information on ITWS data capabilities and available alternatives to acquire such data. The NAS Human Factors Group has proposed developing a capability where ITWS weather data is used by the Distributed Environment for Simulation, Rapid Engineering, and Experimentation (DESIREE) during human-in-the-loop simulations. (E. Stein, WJHTC)

NTML: Human factors researchers from the NAS Human Factors Group supported a meeting of the National Traffic Management Log (NTML) working group at the Air Traffic Control System Command Center. The NTML is an automated tool for event logging and dissemination of traffic management information. The working group reviews feedback from the field and prioritizes requirements for upcoming software releases. (T. Yuditsky, WJHTC)

CAMI Laboratory Receives Second Professional Certification. The American Board of Forensic Toxicology (ABFT) recently accredited the Bioaeronautical Sciences Research Laboratory at CAMI. The laboratory also holds certification from the College of American Pathologists (CAP), which makes the Bioaeronautical Sciences Research Laboratory the only laboratory in the country to be certified by both the ABFT and the CAP. An article in the March 9, 2004, *Oklahoman* noted the laboratory is only the 15th in the nation certified by the ABFT. In a published quote, Laboratory Director Dr. Dennis Canfield said "It certainly tells the community that we are making a strong effort to see that the quality of the products we produce are correct." The Bioaeronautical Sciences Research Laboratory serves as the primary national toxicology-testing site for FAA and NTSB. Post-mortem toxicology testing is routinely conducted on biological specimens from flight crew fatalities. At NTSB request, the laboratory may also perform toxicological testing to help investigate railway, maritime, pipeline, or highway accidents. Because of the legal consequences of a positive drug finding, these tests are considered "forensic." This is yet another reason it's so crucial the laboratory maintain high standards of quality.

NASA Office of Aeronautics Newsletter: The latest issue of the Office of Aeronautics newsletter is now on-line at http://www.aero-space.nasa.gov/curevent/news/index.htm. This issue features information on the NASA reorganization, the 100th Anniversary of Flight celebration, and the Next Generation Air Transportation System Initiative. (T. Kraus, AAR-200)

More information on human factors research can be found at the FAA Human Factors (AAR-100) web site: http://www.hf.faa.gov

Mark D. Rodgers
FAA (AAR-100)

March 29-April 1, 2004 – 47th Annual Aircraft Electronics Association Trade Show, Paris Las Vegas Hotel, Las Vegas, NV
http://www.aea.net/PressRoom/AEAConvention0104.pdf?Category=8

April, 2004 – SAE General Aviation Technology Conference and Exhibition, Century II Convention Center, Wichita, *KS* http://www/sae.org/calendar/aeromtgs.htm

April 13-19, 2004 – Sun 'n Fun, Lakeland Linder Regional Airport, Lakeland, FL
http://www.sun-n-fun.org/content/

April 18-21, 2004 – FAA Worldwide Airport Technology Transfer Conference, Hilton Atlantic City Hotel, Atlantic City, NJ *http://www.airtech.tc.faa.gov/att04/*

April 20-22, 2004 – SAE General Aviation Technology Conference and Exhibition, Century 21 Convention Center, Wichita, KS *http://www.sae.org/calendar/aeromtgs.htm*

April 20-22, 2004 – Air Transport Association MRO Conference and Exhibition, Cobb Galleria, Atlanta, GA *http://www.AviationNow.com/conferences*

April 20-22, 2004 – General Aviation Technology Conference& Exhibition, Century Two Convention Center, Wichita, KS *General Aviation Technology Conference & Exhibition*

April 21-23, 2004 – Phoenix Sky harbor International Aviation Symposium 2004, J.W. Marriott Desert Ridge Resort, Phoenix, AZ *http://www.phxskyharbor.com*

April 22-23, 2004 – 4th Air Cargo Economics Conference, Prague, Czech Republic
http://euroavia.com

April 24-29, 2004 – CHI 2004, Conference on Human Factors in Computing Systems, Vienna, Austria *http://www.acm.org/sigchi/chi2004/*

April 25-28, 2004 – SAE Cabin Safety Technical Committee Meeting, Oklahoma City, OK
mlemank@sae.org

April 27-29, 2004 – 49th Annual Corporate Aviation Safety Seminar, Tucson, AZ
http://www.flightsafety.org/cass04_cfp.html

May 3-6, 2004 – SAE Aircraft Oxygen Equipment Committee, Anchorage, AK
mlemank@sae.org

May 3-6, 2004 – 75th Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK http://www.asma.org/

May 6-8, 2004 - AHS International 60th Annual Forum and Technology Display, Virginia Beach, VA. Contact Staff@vtol.org

May 10-12, 2004 – Royal Aeronautical Society 10th AIAA CEAS Aeroacoustics Conference, Manchester Town Hall, UK *http://www.aerosociety.com/homepage.asp*

May 10-13, 2004 – DOD TAG-51, Atlantic City, NJ *http://hfetag.dtic.mil/meetschl.html*

May 11-13, 2004 – SAE SEAT – Aircraft Seat Committee, Savannah, GA
mlemank@sae.org

May 17-18, 2004 - The Technical Cooperation Program, Human Resources and Performance Group (HUM)-TP9, Human Systems Integration Workshop, Ottawa, Ontario, Canada
http://hfetag.dtic.mil/news.html

May 18-20, 2004 – Aviation Industry Week, Las Vegas Convention Center, Las Vegas, NV
http://www.AviationIndustryWeek.com

May 23-26, 2004 – Tenth International Conference on Mobility and Transport for Elderly and Disabled People, Hamamatsu, Japan http://trb.org/calendar/

May 25, 2004 - Human Factors Integration Symposium, MoD, Abbey Wood, Bristol, UK
http://hfetag.dtic.mil/docs/HFI-Symposium-Flyer.doc

May 26-27, 2004 – Royal Aeronautical Society Conference – Flight Simulation 1929-2029, A Centennial Perspective, London, UK *http://www.aerosociety.com/homepage.asp*

June 7-11, 2004 – 2004 US/Europe International Aviation Safety Conference (FAA/JAA), Philadelphia, PA *http://www.jaa.nl/conference/20th/closing.html*

June 15-17, 2004 – SAE Digital Human Modeling for Design and Engineering Meeting, Oakland University, Rochester, Michi*gan* *http://www.sae.org/calendar/aeromtgs.htm*

July 8, 2004 - Human Factors Tool Symposium, Orlando, Florida
http://hfetag.dtic.mil/docs/NASA-Tools-Workshop.doc

July 19-25, 2004 – Farnborough International 2004, Farnborough Aerodrome, England
http://www.farnborough.com/

July 22-August 2, 2004 – 52nd Annual EAA AirVenture Fly-In, Wittman Field, Oshkosh, WI
EAA AirVenture Oshkosh 2004

July 27-August 2, 2004 – 52nd Annual AirVenture, Oshkosh, WI http://airventure.org/

July 28 – August 1, 2004 – 112th Convention of the American Psychological Association. Honolulu, Hawaii http://www.apa.org/convention

August 1-4, 2004 – Designing Interactive Systems, Cambridge, MA
http://www.sigchi.org/DIS2004/

August 8-12, 2004 – 31st International Conference on Computer Graphics and Interactive Techniques, Los Angeles Convention Center, Los Angeles, CA
http://www.vr.clemson.edu/eyetracking/etra/2004/

September 8-9, 2004 – Civil Aviation Safety Symposium 2004, Westin Hotel Galleria, Dallas, TX *http://www.asdnet.org/cass/default.htm*

September 20-24, 2004 – Human Factors and Ergonomics Society 48th Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA http://www.hfes.org/

September 27-29, 2004 – SAFE Association 42nd Annual Symposium, Grand America Hotel, Salt Lake City, UT *http://www.safeassociation.com/symposium.htm*

September 29 – October 1, 2004 – 2004 International Conference on Human Computer Interaction (HCI-Aero), Toulouse, France
http://www.eurisco-international.com/hci-aero2004.

October, 2004 – 18th Airbus/JetBlue Human Factors Symposium, New York City, NY
http://www.airbus.com/customer/events.asp

October 4-7, 2004 – SAE SEAT – Aircraft Seat Committee Meeting, Albuquerque, NM
mlemank@sae.org

October 10-16, 2004 – ACM Multi-Media 2004, New York, NY http://www.mm2004.org/

October 12-14, 2004 – Shared Vision of Aviation Safety Conference, San Diego, CA
http://www.aviationsafetyconference.com/index2.html

October 12-14, 2004 – 57th Annual Business Aviation Association Meeting and Convention, Las Vegas County Convention Center, Las Vegas, NV *http://web.nbaa.org/public/cs/amc/*

October 13-15, 2004 – Sixth International Conference on Multimodal Interfaces, Penn State University, State College, PA http://www.icmiplace.org/

October 18-19, 2004 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC *http://wwwsearch.nationalacademies.org/*

October 21-23, 2004 – Aircraft Owners and Pilots Association Expo 2004, Long Beach Convention and Entertainment Center, Long Beach, CA *http://www.aopa.org/expo/2003/virtual/*

October 23-27, 2004 – NordiCHI 2004, Tampere, Finland *http://www.cs.uta.fi/nordichi2004/*

October 24-27, 2004 – UIST 2004, 17th Annual ACM Symposium on User Interface Software and Technology, Santa Fe, NM http://www.acm.org/uist/

October 25-28, 2004 – SAE S-9 Cabin Safety Technical Committee Meeting, San Diego, CA mlemank@sae.org

October 25-28, 2004 – DoD Maintenance Seminar and Exhibition, Hilton Americas, Houston, TX *http://www.sae.org/calendar/aeromtgs.htm*

November 15-18, 2004 – 57th Annual International Air Safety Seminar ("Sharing Knowledge to Improve Safety"), Pudong Shangri-La Hotel, Shanghai, China
http://www.flightsafety.org/seminars.html

January 9-13, 2005 – TRB 84th Annual Meeting, Washington, DC http://trb.org/calendar/

April 11-15, 2005 – SAE 100th Anniversary World Congress, Cobo Hall, Detroit, MI
http://www.sae.org/congress/about/news/congressdates.htm

May 9-12, 2005 - 76th Annual Scientific Meeting of the Aerospace Medical Association, Kansas City, MO *http://www.asma.org/*

August 18-21, 2005 - 113th Convention of the American Psychological Association, Wash, DC
http://www.apa.org/convention

September 12-16, 2005 – Interact 2005, Tenth IFIP TC13 International Conference on Human-Computer Interaction, Rome, Italy http://www.interact2005.org/

September 26-30, 2005 – Human Factors and Ergonomics Society 49th Annual Meeting, Royal Pacific Resort at Universal Orlando, Orlando, FL *http://hfes.org/meetings/menu.html*

October 24-25, 2005 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, *DC http://wwwsearch.nationalacademies.org/*

January 22-26, 2006 – TRB 85th Annual Meeting, Washington, DC http://trb.org/calendar/

Note: Calendar events in Italics are new since the last Newsletter

Comments or questions regarding this newsletter?
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